MISCELLANEOUS PHENOMENA.

DROUGHT.

A protracted drought was general throughout Alabama, Louisiana, Michigan, and Minnesota, east-central Texas, the extreme northern part of South Carolina, the northeastern parts of Indiana and Illinois, northern Iowa, and the northwestern portions of Ohio and Wisconsin. The following are reports on drought in sections of the country where it was the most severely felt. The report of the Alabama weather service states that the precipitation for the month in that state was less than in any month of October since the establishment of that service; that the wells were so low in some portions of the state as to cause serious apprehension that much disease would result, and that the potato and turnip crops were considerably damaged by the dry condition of the ground. The report of the Louisiana weather service states that the drought during the month was unbroken save by occasional local sprinkles; that in a majority of parishes the rainfall was barely measurable, and at a number of places no rain was reported; that the drought was a continuation of that existing in northern Louisiana from the first ten days of September and in southern Louisiana from September 25th, the date of the last general rain; and that in consequence of the drought the fall garden produce was a complete failure. The report of the Minnesota weather service states that a prolonged drought continued throughout the month; that it was the dryest October ever experienced in that state; that the precipitation for the month was but about 6 per cent. of the normal; that the stage of water in rivers was very low, and some of the smaller lakes and rivers were entirely dry, and that farmers in certain localities were obliged to drive their cattle several miles to obtain water. The Signal Service observer at Port Huron, Mich., reports that the drought continued in that vicinity, and that the rainfall during the month afforded only slight relief; that farmers report the condition of sown wheat as unsatisfactory on account of the dryness of the soil, and the wells are dry. A report from Decatur, Ind., dated October 22, 1889, states that no rain had fallen in that section for six weeks; that wells and cisterns were giving out, and that stock was suffering for want of water. Mr. John W. James, voluntary observer at Riley, Ill., reports, under date of the 31st, that on account of the protracted drought pastures were parched; that the ground was harder than ever before known at that season, and that no fall plowing had been done in consequence. Mr. John S. Seely, voluntary observer at Oswego, Ill., reports that the rainfall for the month was the smallest October rainfall in nine years; that the ground was too dry for plowing, and that wells and springs were very low and many of them dry.

The Signal Service observer at Dubuque, Iowa, reports, under date of the 28th, that the drought was very extensive, and was becoming serious in sections where the water supply was short for the stock, and that the ground was too dry for plowing. The Signal Service observer at Sioux City, Iowa, reports, under date of the 8th, that a severe drought prevailed in the adjacent country, and that in many localities cattle had to be driven miles for water; and under date of the 31st he reports that in the northern part of the state the water supply was very short, and that farmers were buying water by the barrel for their stock. Mr. J. Fred. Bayerly, volunteer observer at Cedar Springs, S. C., reports that a protracted drought prevailed in that section from September 24th throughout October, and that water was scarce and wells failing. The Signal Service observer at Palestine, Tex., reports, under date of the 29th, that but little rain had fallen in that section for over a month; that the soil was dry and hard, and farmers had been unable to do their work satisfactorily, and that the drought was broken by heavy rain the evening of the 29th. The Signal Service observer at La Crosse, Wis., reports, under date of the 24th, that the ground was very dry and parched, and that the drizzle that fell during that day was the first rain of the month. Dr. T. C. Hunter, voluntary observer at Napoleon, Ohio, reports that on account of the drought the wells and streams in that section were very low and many entirely dry, and that water had to be hauled for all purposes.

FOREST FIRES.

Destructive marsh fires were reported near Jackson, Mich., on the 3d and 22d, and in the interior of the state on the 17th, doing considerable damage to standing timber, outbuildings, etc. On the west side of the Grand River, opposite Portland, Mich., fires were reported from the 11th to 14th, and on the 21st forest fires were raging about Coleman, Mich. Mr. J. M. Harrison, voluntary observer at Friendship, Wis., reports that forest fires from the 15th to 25th burned hundreds of tons of hay and large quantities of timber in that section. Destructive fires were reported at Ellsworth, Wis., on the 22d, and at Chippewa Falls, Wis., on the 19th. In Minnesota destructive forest fires were reported at Saint Peter on the 4th; at Stillwater on the 16th; and in the vicinity of Princeton they were reported under date of the 19th as having been raging in that section for three weeks. The Signal Service observer at Rapid City, Dak., reported a forest fire west of that place on the 17th. Fires were reported in the neighborhood of Decatur, Ind., on the 22d, and about fifty miles south of Palestine, Tex., on the 28th.

PRAIRIE FIRES.

An extensive prairie fire was reported near Spirit Lake, Iowa, on the 5th; in Palo Alto Co., Iowa, on the 7th; near Fergus Falls, Minn., on the 24th, and about Bismarck, Dak., on the 19th.

HALOS.

Solar halos were most frequently reported in Illinois, where they were noted on thirteen dates; in California on ten dates; in Ohio on nine dates; in Indiana and South Carolina on seven dates; in Massachusetts and Nevada on six dates; and on from one to five dates, inclusive, in Arkansas, Colorado, Georgia, Idaho, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Michigan, Minnesota, Missouri. Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Tennessee, Texas, Utah, Virginia, Washington, Wisconsin, and Wyoming. In states and territories other than those named no solar halos were reported. They were reported in the greatest number of states and territories, eleven, on the 19th; in nine on the 3d; in eight on the 12th, 21st, and 24th; in seven on the 30th; in six on the 5th, 16th, 17th, 18th, and 22d; in from one to five, inclusive, on the 1st, 2d, 4th, 8th to 11th, 13th, 14th, 15th, 20th, 23d, 25th to 29th, and 31st. No solar halos were reported on the 6th and 7th.

Lunar halos were most frequently reported in Iowa, where they were noted on eight dates; in California, Illinois, and Nevada on seven dates; in Wisconsin on six dates; and on from one to five dates, inclusive, in Arizona, Arkansas, Colorado, District of Columbia, Florida, Georgia, Indiana, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Dakota, Tennessee, Texas, Virginia, Washington, and Wyoming. In states and territories other than those named no lunar halos were reported. They were reported in the greatest number of states and territories, seventeen, on the 3d; in ten on the 4th; in sixteen on the 5th; in nine on the 6th; in seven on the 10th and 11th; in six on the 1st, 2d, and 31st; in from one to five on the 7th, 8th, 12th to 19th, and from the 27th to the 30th. For dates other than those named no lunar halos were reported.

METEORS.

The distribution of meteors, by dates, was as follows: 2d, Matanzas, Fla.; Rugby, Tenn. 6th, Lead Hill, Ark.; Fort

Washakie, Wyo. 7th, Lead Hill, Ark. 9th, Butlerville, Ind. 12th, Rugby, Tenn.; Mesquite, Tex. 13th, North Sutton, N. H. 14th, Manson, Iowa; Vevay, Ind.; Fairmont, Minn.; Palestine, Tex. 15th, Ilion, Ithaca, Trumansburgh, and Wedgwood, N. Y. 16th, Fairmont, Minn.; Egg Harbor City, N. J.; Trumansburgh, N. Y. 17th, Ames and McCausland, Iowa; Las Vegas, N. Mex.; Statesburgh, S. C. 18th, Auburn, Ala.; Wichita, Kans.; Montevideo, Minn.; Eagle's Mere, Pa. 19th, Egg Harbor City, N. J.; Statesburgh, S. C.; Dale Enterprise, Va. 20th, Dale Enterprise, Va. 21st, Barren Creek Springs, Md.; Amherst, Mass.; East Portland, Oregon; Memphis, Tenn. 23d, Rugby, Tenn. 24th, Villa City, Fla.; Atlanta, Ga.; Rugby, Tenn. 25th, Amherst, Mass. 26th, Auburn, Ala.; North Sutton, N. H. 27th, Saint Vincent, Minn. 29th, Fort Thomas, Ariz. 31st, Berkley, Cal.; Villa City, Fla.

Ilion, N. Y.: a brilliant meteor was observed at 6.34 p. m., 15th, moving rapidly towards the west. It seemed to start from the zenith, growing brighter, and followed by a long trail of light. When at an altitude of 20° or 25° it burst without report, and was followed by a long trail of brilliant sparks.—*Report of Mr. G. A. Trowbridge, voluntary observer.*

Wichita, Kans., 18th: a brilliant meteor was observed passing horizontally westward at an elevation of 30° and about 10° east of north. The meteor remained visible four seconds.—*Report of F. L. Johnson, observer, Signal Corps.*

Dale Enterprise, Va.: unusual meteoric displays were observed during the night of the 19-20th. The greatest frequency being noted between 1 and 2 a. m., 20th, when the average was one in about every forty seconds. The radiant point was a little south of east, apparently in the constellation Taurus.—*Report of L. J. Heatwole, voluntary observer.*

Fort Thomas, Ariz.: a brilliant meteor of a bright green color was observed at 8 p. m. on the 29th, moving from southwest to northeast at an elevation of 45°.—*Report of A. T. Sherwood, observer, Signal Corps.*

MIRAGE.

Mirage were observed as follows: Hampton, Iowa, 27th, 28th; Fairmont and Montevideo, Minn., 18th; Webster, Dak., 17th; Woonsocket, Dak., 27th.

SAND STORMS.

Sand storms were reported during the month as follows: Wilcox, Ariz., 6th and 30th; Winnemucca, Nev., 6th and 7th; Fresno, Cal., 7th.

SUN SPOTS.

Mr. John W. James, Riley, Ill.: the large single spot that was seen on sun's meridian September 29th, split in two October 2d, and vanished by the 4th, before reaching the edge. No other spot was seen the rest of the month. Mr. C. E. Buzzell, Leaf River, Ill.: solar observations in October, 1889, were made only on the 1st, 2d, 3d, 4th, 11th, 17th, 27th, and 28th; on other dates clouds and haze prevented the observations from being taken. The group of September 26th disappeared in faculæ October 4th. No other disturbances were observed.

Mr. M. A. Veeder, Lyons, N. Y.: the spot that came into view September 23d, was seen October 1st and 2d approaching the western limb. Faculæ in its location returned by rotation October 19th. Faculæ, that appeared September 28th, seen nearing the western limb October 8th. October 8th, faculæ appeared and persisted throughout the transit, being seen near the western limb on October 18th and 19th. Groups of faculæ appeared by rotation on October 14th, 15th, 17th, 19th, 21st, 23d, and 24th. Observations were poor or wanting on many days in this month.

Mr. H. D. Gowey, North Lewisburgh, Ohio: sun spots were observed on the 1st and 2d.

Haverford College Observatory, Pa., (observed by Prof. F. P. Leavenworth):

Date.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculæ.		Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Faculæ.	
Oct., 1889.											
1, 10 a. m	0	0	0	0	0	0	1	5	.....	.....	Definition poor, big spot breaking up.
2, 9 a. m	0	0	0	0	0	0	1	14	.....	.....	Definition good.
3, 12 m	0	0	0	0	0	0	1	4	.....	.....	Definition good, big spot gone to pieces.
4, 12 m	0	0	0	0	0	0	1	1	.....	.....	Definition poor.
5, 12 m	0	0	1	1	0	0	0	0	.....	.....	Definition poor.
7, 10 a. m	0	0	0	0	0	0	0	0	.....	.....	Definition poor.
8, 10 a. m	0	0	0	0	0	0	0	0	.....	.....	Definition poor.
9, 10 a. m	1	4	0	0	0	0	1	4	.....	.....	Definition good, spots small.
10, 11 a. m	0	4	0	0	0	0	1	8	.....	.....	Definition good.
11, 11 a. m	0	0	0	0	0	0	0	0	.....	.....	Definition poor and cloudy.
12, 10 a. m	0	0	0	0	0	0	0	0	.....	.....	Definition good.
15, 3 p. m	0	0	0	0	0	0	0	0	.....	.....	Definition poor and cloudy.
16, 10 a. m	1	5	0	0	0	0	1	5	.....	.....	Definition poor, spots small.
17, 10 a. m	0	7	0	0	0	0	1	12	.....	.....	Definition good.
18, 10 a. m	0	0	0	10	0	0	1	2	.....	.....	Definition good.
19, 10 a. m	0	0	1	2	0	0	0	0	.....	.....	Definition good.
20, 9 a. m	0	0	0	0	0	0	0	0	.....	.....	Definition good.
21, 10 a. m	0	0	0	0	0	0	0	0	.....	.....	Definition poor.
22, 10 a. m	0	0	0	0	0	0	0	0	.....	.....	Definition poor.
24, 10 a. m	0	0	0	0	0	0	0	0	.....	.....	Definition poor.
30, 11 a. m	0	0	0	0	0	0	0	0	.....	.....	Definition poor.

STATE WEATHER SERVICES.

[*Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.*]

The following extracts are republished from reports for September, 1889, of the directors of the various state weather services:

ALABAMA.

The average rainfall for the month was 1.46 below the normal, and the season has been unusually dry. October is generally considered to be a dry month, but the period just closed produced less precipitation than in any other year since this service was organized. The wells have been so low in some portions of the state as to cause serious apprehensions that much disease would result. The dry season, however, has been of great advantage to the farmers, giving them an excellent opportunity for gathering the rapidly opening cotton; and there has been only a small percentage of the staple stained.

Frost occurred several times during the month, but, except in extreme north Alabama, they have all been light. The one on the 28th was reported by some observers as sufficiently heavy to kill tender vegetation. The temperature was 2 below the normal.

SUMMARY.

Temperature.—Monthly mean, 61.2; highest monthly mean, 77.5, at Selma; lowest monthly mean, 41, at Valley Head; maximum, 90, at Double Springs, 4th, and at Pine Apple, 6th; minimum, 27, at Double Springs, 9th, and at Valley Head, 8th; range for state, 63.

Precipitation.—Average for the state, 0.98; greatest, 2.30, at Eufaula; least, 0.08, at Mobile.

Wind.—Prevailing direction, northwest.—*P. H. Mell, Signal Corps, Auburn, director.*

ARKANSAS.

SUMMARY.

Temperature.—The mean temperature of the month, 61.8, was 2.7 above the mean of October of last year.

Frost was reported at many places from the 7th, 8th, 9th, 14th, 15th, 16th, and a general frost occurred on the mornings of the 27th and 28th.

Precipitation.—The average rainfall for the state, 1.64, is 0.56 below the average for the same month last year. With the exception of a few places there was no rainfall reported in the state until the 29th, and then, although a general rain, it was not very heavy, except in a few localities where it was accompanied by thunder and lightning and some wind, and nowhere was excessive rain reported. The average number of rainy days was 4.6.—*M. F. Locke, Commissioner of Agriculture, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.*

COLORADO.

SUMMARY.

Temperature.—The monthly average for the state, 46.9, is about 2.0 above